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RADIOLOGICAL HEALTH DATA

MONTHLY REPORT

June 1960

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service

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Public Health Service

Division of Radiological Health

PREFACE

In August 1959, the President directed the Secretary of Health, Education, and Welfare to intensify Departmental activities in the field of radiological health. The Department was assigned, among other things, primary responsibility within the Executive Branch for the collation, analysis, and interpretation of data on environmental radiation levels. Within the Department this responsibility has been delegated to the Division of Radiological Health, Public Health Service.

As a step in the discharge of this responsibility, the Public Health Service initiated this monthly publication. The data have been submitted by agencies of the Federal government, by States, and by other sources. Each third report, starting July 1960, will contain interpretative statements as well as data.

The monthly and quarterly reports are reviewed by a Board of Editorial Advisors with representatives from the following Federal agencies:

Department of Health, Education, and Welfare
Atomic Energy Commission
Department of Defense
Department of Commerce
Department of Agriculture

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SECTION I

MILK

PUBLIC HEALTH SERVICE MILK MONITORING PROGRAM

The U. S. Public Health Service Milk Monitoring Network presently consists of 12 sampling stations. This will be expanded to about 60 stations by the summer of 1960.

The initial purpose of establishing this network was in keeping with the normal and continuing program of the Department of Health, Education, and Welfare to determine trends in our changing environment, including measurement of amounts of radioactivity in water, air, milk, and other foods. Milk was the food chosen for initial testing since it is among the most important elements of the diet and is constantly available at all seasons of the year and in all climates. A primary objective of the project was to develop and simplify methods of collection and radiochemical analysis of milk to make them more suitable for larger scale programs.

The selection of the present 12 sampling stations was based on the following criteria:

1. The milk represented in each sample was from a group of farms milking a total of at least 1,000 cows.

2. The number of individual farms was small enough so that collection of collateral field data from each farm was feasible.

3. The milk samples were from a supply that was part of a metropolitan milkshed.

4. The conditions under which the milk was received were such that each sample was representative of the same farms in the production area.

The Overton, Nevada and St. George, Utah milksheds do not fulfill the 1,000 cow minimum requirement but have been included since they are part of the monitoring program around the Nevada Test Site.

One gallon samples are collected once each month and forwarded by air parcel post to the Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio, for radionuclide analysis. It is estimated that these samples represent 2,000 gallon lots. The concentration of iodine-131, barium-140, and cesium-137 and naturally occurring potassium-40 are all currently being measured when present in the milk by gamma scintillation spectroscopy. Total strontium and strontium-90 are determined following radiochemical separations, and the strontium-90 is calculated by measuring the build-up of the daughter decay product, yttrium-90 (after about a two week wait) using a low background anticoincidence beta counter. The total radioactive strontium is counted in a shielded internal proportional counter with the strontium-89 calculated as the difference.

Publication of the data normally requires a period of about three months after collection due to shipment, processing, decay product build-up, compilation of the data, and inclusion with other radiation data in the monthly reports.

A description of the program appears in "The Occurrence of Strontium-90, Iodine-131 and Other Radionuclides in Milk, May 1957 through April 1958," by J. E. Campbell, G. K. Murthy, A. S. Goldin, H. B. Robinson, C. P. Straub, F. J. Weber, and K. H. Lewis, American Journal of Public Health, Vol. 49, No. 2, Feb. 1959, American Public Health Association, reprinted by the Joint Committee on Atomic Energy Hearings on Fallout from Nuclear Weapons Tests, Vol. 1, May 1959.

Detailed technical descriptions of the methodology of analyses are listed below:

"Determination of I-131, Cs-137 and Ba-140 in Fluid Milk by Gamma Spectroscopy." By G. R. Hagee, G. R. Karches, and A. S. Goldin, Public Health Service.

"A Method for the Rapid Ashing of Milk for Radionuclide Analysis," Journal of Dairy Science, 42-1288, Aug. 1959. By G. K. Murthy, J. E. Campbell.

"A Method for the Determination of Radionuclides in Milk Ash." Journal of Dairy Science, 14-1276, Aug. 1959. By G. K. Murthy, L. P. Jarnagin, and A. S. Goldin.

"A Method for the Elimination of Ashing in Strontium-90 Determination of Milk," Journal of Dairy Sciences, 43 (2) 151, Feb. 1960. By G. K. Murthy, J. E. Coakley, and J. E. Campbell.

TABLE I.--PUBLIC HEALTH SERVICE DATA ON RADIOACTIVITY IN MILK

JANUARY 1960

Data from one sampling point supplying the cities listed below

Radioactivity in uuc/liter

Area	Calcium grams/liter		Iodine-131		Strontium-89		Strontium-90		Barium-140		Cesium-137	
	Jan.	Yearly average	Jan.	Yearly average	Jan.	Yearly average	Jan.	Yearly average	Jan.	Yearly average	Jan.	Yearly average
			(a)		(a)				(a)	(a)		
Atlanta, Ga.	1.24	1.18	0	3	0	40	12.8	15.4	0	0	45	83
Austin, Tex.	1.15	1.12	0	2	0	21	7.3	6.2	0	< 1	25	45
Chicago, Ill.	1.16	1.10	0	2	0	11	9.2	8.8	0	0	35	54
Cincinnati, Ohio	1.11	1.13	0	1	0	16	11.5	12.8	0	0	45	48
Fargo, N. Dak. Moorhead, Minn.	1.22	1.13	0	1	0	14	11.3	14.3	0	0	45	59
New York, N. Y.	1.07	1.08	0	2	0	8	10.2	9.6	0	0	45	51
Overton, Nev.(b)	1.17	1.08	0	< 1	0	2	3.9	3.2	0	0	15	23
Sacramento, Calif.	1.16	1.14	0	< 1	0	12	2.7	4.9	0	0	10	42
Salt Lake City, Utah	1.13	1.12	0	2	0	8	7.5	6.9	0	0	40	44
Spokane, Wash.	1.25	1.17	0	3	0	20	13.9	12.6	0	0	50	69
St. George, Utah(c)	1.10	1.11	0	< 1	0	4	3.8	4.5	0	0	15	29
St. Louis, Mo.	1.35	1.26	0	< 1	7	56	21.8	22.5	0	< 1	40	78

(a) Zero means below detectability.
(b) Average includes 11 months from start of the regular monthly collections.
(c) Average includes 10 months from start of the regular monthly collections.

ATOMIC ENERGY COMMISSION DATA ON RADIOACTIVITY IN MILK

Routine milk monitoring is conducted at New York City, Perry, New York, and Mandan, North Dakota, with analyses performed at the Atomic Energy Commission's New York Health and Safety Laboratory. Data for these three locations for the month of December 1959 are presented below. Data for previous months were given in HASL-Reports; the most recent being listed below* and Radiological Health Data, April and May 1960.** A list of publications for previous data may be found in Radiological Health Data, April 1960.

TABLE II.--STRONTIUM-90 AND CALCIUM IN DECEMBER 1959 MILK

Health and Safety Laboratory (HASL) Sampling Locations

	$\mu\mu$c strontium-90 per			grams Ca per	
	liter	kg (powder)	g Ca	liter	kg (powder)
Perry, N. Y. (Powdered whole milk)		59.9	7.7		7.8
New York City (Whole liquid milk)	11.7		9.2	1.3	
Mandan, N. Dak. (Powdered buttermilk)		282	25.0		11.3

*Health and Safety Laboratory Fallout Program Quarterly Summary Report, April 1960, available from the Office of Technical Services, Department of Commerce, Washington 25, D. C., for $3.50.

**U. S. Department of Health, Education & Welfare Publications available from the Office of Technical Services, Department of Commerce, Washington 25, D. C. Price 50 cents single issue.

SECTION II

AIR

PUBLIC HEALTH SERVICE RADIATION SURVEILLANCE NETWORK

The Public Health Service Radiation Surveillance Network was established in 1956 in cooperation with the Atomic Energy Commission to provide a means of promptly determining increases in environmental radiation due to radioactive fallout during nuclear weapons tests. The program has proven sufficiently valuable that it has been extended to a round-the-year basis and currently consists of 44 stations at urban locations (see figure 1) operated by State and local health department personnel except 3 which are operated by U. S. Public Health Service personnel.

Measurements of gross beta radioactivity in air have been taken since they provide one of the earliest and most sensitive indications of increases of activity in the environment, and thus act as an "alert" system. These data alone are not conducive to evaluation directly of biological hazards. However, field measurements do enable the operator to estimate the amount of beta activity of particulates in the air at the station five hours after collection, by comparison to a known source, using a portable survey meter. The filters are then forwarded to the laboratory in Washington for a more refined measurement using a thin window proportional counter.

Air samplers are in operation at the 44 stations on an average of 70% of the week. Air is drawn through a cellulose carbon loaded dust filter at a rate of 55 CFM using a high volume air sampler. The radioactive material in fallout adhering to small dust-like particles is retained on the filter. Some gaseous fission products are absorbed by the carbon. The contribution by gaseous fission products has represented only a small part of the total beta activity in these samples.

About 88% of the stations collect samples of precipitation which are sent to Washington for analysis. Values are now below limits of detection by present instrumentation. New equipment is being procured to measure lower values. Measurements have indicated that the bulk of deposited activity occurs through precipitation but concentrations in surface air are not directly relatable to the amount deposited through precipitation.

FIGURE 1

PUBLIC HEALTH SERVICE RADIATION SURVEILLANCE NETWORK

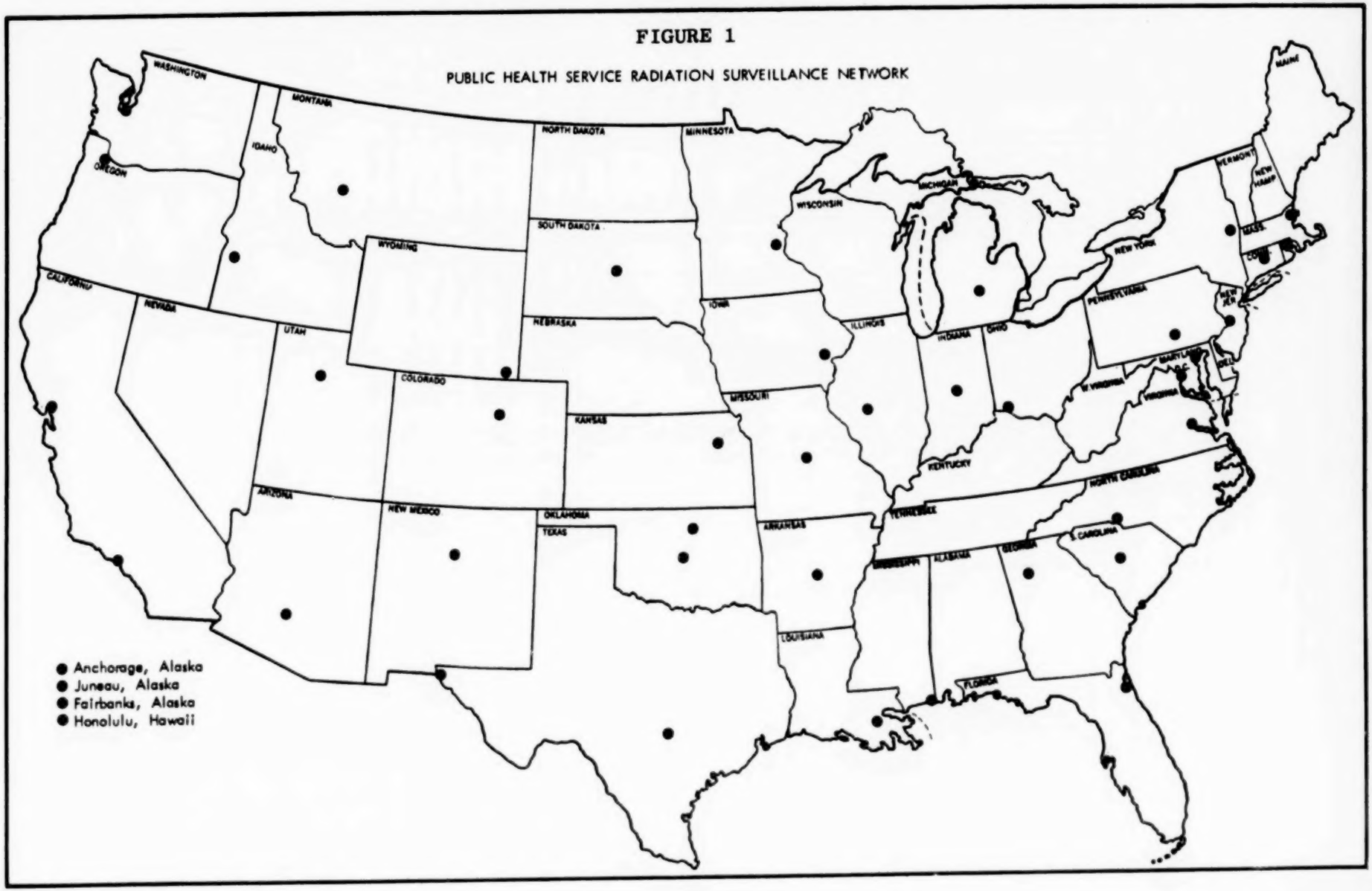

TABLE III.—PUBLIC HEALTH SERVICE RADIATION SURVEILLANCE NETWORK

Radioactivity of Particulates in Air
Micromicrocuries Per Cubic Meter—Gross Beta Counts
For month of January 1960

Station location	Weighted average	Maximum	Minimum
Alaska, Anchorage	< 0.10	0.18	< 0.10
Alaska, Fairbanks	< 0.10	0.17	< 0.10
Alaska, Juneau	< 0.11	0.16	< 0.10
Arizona, Phoenix	< 0.14	0.19	< 0.10
Arkansas, Little Rock	< 0.11	0.14	< 0.10
California, Berkeley	< 0.12	0.24	< 0.10
California, Los Angeles	< 0.14	0.24	< 0.10
Colorado, Denver	< 0.16	0.26	< 0.10
Connecticut, Hartford	< 0.11	0.16	< 0.10
District of Columbia	< 0.13	0.25	< 0.10
Florida, Jacksonville	< 0.12	0.22	< 0.10
Georgia, Atlanta	< 0.11	0.16	< 0.10
Hawaii, Honolulu	< 0.12	0.22	< 0.10
Idaho, Boise	-	-	-
Illinois, Springfield	< 0.15	0.35	< 0.10
Indiana, Indianapolis	< 0.11	0.19	< 0.10
Iowa, Iowa City	< 0.11	0.21	< 0.10
Kansas, Topeka	< 0.11	0.16	< 0.10
Louisiana, New Orleans	0.13	0.16	0.11
Maryland, Baltimore	< 0.12	0.20	< 0.10
Massachusetts, Lawrence	< 0.11	0.14	< 0.10
Michigan, Lansing	< 0.11	0.19	< 0.10
Minnesota, Minneapolis	< 0.10	0.13	< 0.10
Mississippi, Pascagoula	< 0.21	0.35	< 0.10
Missouri, Jefferson City	< 0.15	0.21	< 0.10
Montana, Helena	< 0.11	0.15	< 0.10
New Jersey, Trenton	< 0.10	0.18	< 0.10
New Mexico, Santa Fe	< 0.17	0.25	< 0.10
New York, Albany	< 0.12	0.29	< 0.10
North Carolina, Gastonia	< 0.14	0.17	< 0.10
Ohio, Cincinnati	0.42	1.30	0.10
Oklahoma, Oklahoma City	< 0.13	0.31	< 0.10
Oklahoma, Ponca City	< 0.10	0.10	< 0.10
Oregon, Portland	< 0.14	0.27	< 0.10
Pennsylvania, Harrisburg	< 0.12	0.29	< 0.10
Rhode Island, Providence	< 0.11	0.16	< 0.10
South Carolina, Columbia	< 0.13	0.18	< 0.10
South Dakota, Pierre	< 0.12	0.15	< 0.10
Texas, Austin	< 0.12	0.23	< 0.10
Texas, El Paso	0.27	0.41	0.13
Utah, Salt Lake City	< 0.12	0.20	< 0.10
Virginia, Richmond	< 0.12	0.37	< 0.10
Washington, Seattle	< 0.11	0.17	< 0.10
Wyoming, Cheyenne	< 0.12	0.18	< 0.10

TABLE IV.—RADON AND THORON AIR MEASUREMENTS

January 4-29, 1960
Cincinnati, Ohio

RADIATION SURVEILLANCE NETWORK

(Beta activity included)

Date	Continuous sample collection			Beta (a) activity $\mu\mu c/M^3$	Radon (b) AM $\mu\mu c/M^3$	Radon (c) PM $\mu\mu c/M^3$	Thoron (d) $\mu\mu c/M^3$
	Sample change time	Sampling period (hours)	Volume M^3				
Jan. 4	0806	95.9	107.0	0.2	116	111	0.9
5	0804	23.8	27.0	0.5	177	144	1.1
6	0816	24.0	30.6	0.4	214	133	1.3
7	0812	23.9	30.5	0.7	276	85	2.0
8	0804	23.9	30.4	0.1 (3)	141	136	0.6
11	0802	71.8	90.9	0.4	278	193	2.3
12	0808	24.1	30.4	0.7	289	104	1.9
13	0802	23.9	30.3	0.4	56	81	0.6
14	0810	24.1	30.4	0.3	164	159	0.7
15	0806	23.9	29.7	0.2 (3)	73	179	0.7
18	0808	72.0	88.6	0.4	203	88	1.2
19	0812	24.1	29.9	0.2	50	66	0.4
20	0806	23.9	29.8	0.4	67	55	0.4
21	0806	24.0	30.4	0.4	108	127	0.6
22	0802	23.9	30.1	1.3 (3)	92	139	0.4
25	0804	72.0	89.0	0.2	145	127	1.4
26	0804	24.0	29.8	0.5	266	147	1.3
27	0806	23.9	29.3	1.3	299	121	1.8
28	0806	23.9	27.7	0.6	177	144	1.3
29	0804	23.9	26.1	0.3 (3)	286	132	1.1
29	1500	6.8	(Hrs.) 7.2++	-	-	70	-
	Average.....			0.4	174	130	1.1

(a) Gross beta activity when counted one day after end of sampling or later as indicated by numeral in parenthesis.

(b) Measured within a few minutes of removal of filter from sampler and corrected back to collection time (uncorrected for thoron daughter interference).

(c) Filters are temporarily withdrawn from sampler at about 3 p.m. and counted. (Values are corrected back to removal time.) The filters are then replaced on sampler to complete the sampling period of about 24 hours. Thus, the values in this column are from the same filters that are counted at about 8 a.m. the following day.

(d) Thoron from alpha activity of filter sample counted 7 hours after taking a 24-96 hour sample.

SURFACE AIR MEASUREMENTS

Transient increases in concentrations of beta radioactivity were observed at some of the 44 stations located in the United States of the Public Health Service-Atomic Energy Commission Radiation Surveillance Network during February 1960. A summary report of the data from all of these stations for the month of February will be given in the next issue of Radiological Health Data. The data from 17 stations were selected and reproduced on pages 10-16 to indicate the general trend of radioactivity in the air during the latter part of February. Data from this network indicated an arrival in the United States between February 22-24, 1960. Some measurements were made of the decay of the beta activity yielding results that were only roughly comparable to an origin date of February 13, 1960 (the date of the nuclear detonation in the Sahara).

Measurements by the U. S. Naval Research Laboratory were also made which occurred along the 80th Meridian indicated on arrival date at 10° North, February 25-26. The profile of radioactivity for average measurements of surface air at 14 stations along the 80th Meridian for February 1960 is shown in Figure 2, with a maximum value occurring at 10° North of 3.7 disintegrations per minute (1.8 micromicrocuries) of beta activity per cubic meter of air (at time of measurement which was about two weeks after collection date).

During February of 1959, the average gross beta activity for the United States (PHS Surveillance Network) was about 5.5 micromicrocuries per cubic meter and for the station of 10° North (NRL data) was 6.7 micromicrocuries per cubic meter.

FIGURE 2

RADIOACTIVITY PROFILE FOR FEBRUARY 1960

U. S. NAVAL RESEARCH LABORATORY

Average Measurements of Surface Air at 14 Stations Along 80th Meridian
February 1960

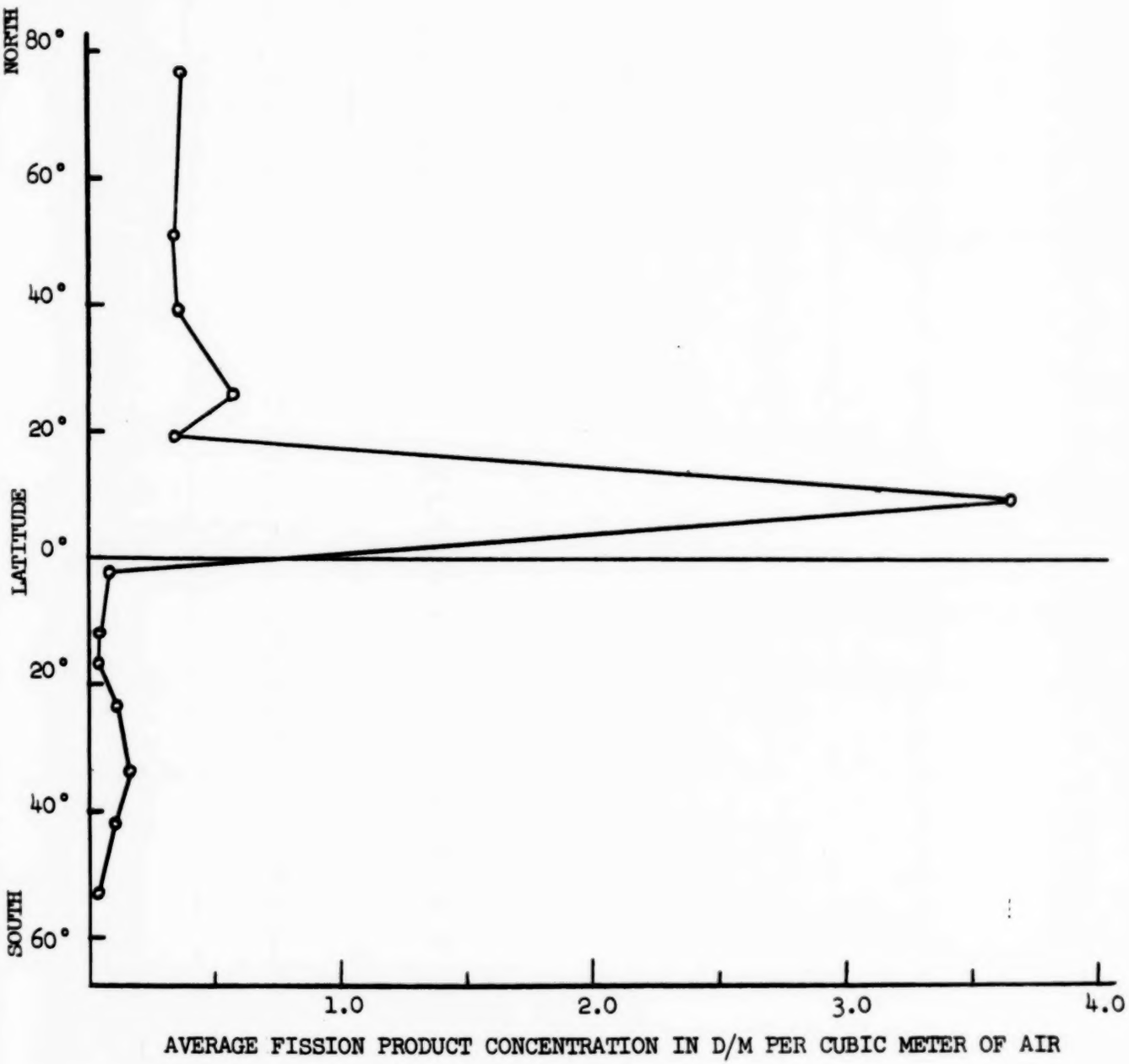

TABLE V.—GROSS BETA RADIOACTIVITY OF PARTICULATES IN AIR

PHS Radiation Surveillance Network

Station location	End of collection (Greenwich mean time)				Sampling period, hours	Days after collection	$\frac{\mu\mu c}{M^3}$*
	Yr.	Mo.	Day	Hr.			
Hartford, Connecticut 011	60	02	18	14	24	5	0.15
						14	<0.10
			19	14	24	4	<0.10
			20	18	28	5	<0.10
			21	21	27	4	<0.10
			22	14	17	3	<0.10
			23	14	24	3	0.43
						10	0.31
			24	14	24	6	<0.10
			25	14	24	5	<0.10
			26	14	24	4	<0.10
			27	16	26	4	<0.10
			28	19	27	3	<0.10
Providence, Rhode Island 013	60	02	15	14	72	3	<0.10
			16	14	24	3	0.16
						10	0.19
			17	14	24	6	<0.10
			18	14	24	5	0.15
						12	0.15
			19	14	24	4	0.11
						11	0.11
			23	14	96	3	0.25
						10	0.16
			24	14	24	6	<0.10
			25	14	24	4	<0.10
			26	14	24	No sample received	
			29	14	72	4	<0.10
	60	03	01	14	24	3	<0.10
Washington, D. C. 032	60	02	17	18	24	6	0.15
						13	0.12
			18	18	24	5	0.16
						12	0.19
			19	18	24	5	0.14
						12	0.14
			20	18	24	3	<0.10
			21	18	24	3	<0.10
			22	18	24	3	0.33
						10	0.20
			23	18	24	3	0.23
						10	0.19
			24	18	24	6	0.16
						13	0.16
			25	19	25	5	0.20
						12	0.16
			26	19	24	4	<0.10
			27	18	23	3	0.11
						10	<0.10
Gastonia, North Carolina 033	60	03	21	13	72	3	0.21
						10	0.22
			22	13	24		
			23	13	24	7	0.26
						14	0.28
			24	13	24	6	0.27
						13	0.22

*At time of measurement.

TABLE V.—GROSS BETA RADIOACTIVITY OF PARTICULATES IN AIR—Con.

PHS Radiation Surveillance Network

Station location	End of collection (Greenwich mean time)				Sampling period, hours	Days after collection	$\frac{\mu\mu C}{M^3}$*
	Yr.	Mo.	Day	Hr.			
Gastonia, North Carolina 033—Con.			25	13	24	5	0.37
						12	0.32
			28	13	72	4	0.40
						11	0.27
			29	13	24	7	0.23
						14	0.29
			30	13	24	6	0.13
						13	0.16
			31	13	24	4	0.13
						11	0.16
Jacksonville, Florida 041	60	02	16	14	24	3	0.14
						10	0.15
			17	14	24	6	0.22
						13	0.19
			18	14	24	5	0.21
						12	0.19
			19	14	24	4	<0.10
			22	14	72	3	0.21
						10	0.15
			23	14	24	3	0.25
						10	0.15
			24	14	24	6	0.30
						13	0.26
			25	14			
			26	14	18		
			29	14	72	4	0.26
						11	0.21
		03	01	13	23	3	0.31
						10	0.26
			02	14	24	5	0.27
							0.25
			03	14	24	4	0.34
						11	0.29
			04	14	24	3	0.13
						10	0.11
Springfield, Illinois 051	60	02	17	16	24	9	0.15
						16	0.12
			18	15	24	8	<0.10
			19	15	24	7	0.12
						14	0.10
			20	15	24	6	0.11
						13	0.15
			21			No sample received	
			22	15	24	4	0.56
						11	0.38
			23	15	24	3	0.15
						10	0.12
			24	15	24	3	0.12
						10	0.13
			25	15	24	11	0.12
						18	<0.10
			26	15	24	10	<0.10
			27			No sample received	
Austin, Texas 073	60	02	16	14	24	7	<0.10
			17	14	24	6	<0.10

*At time of measurement.

TABLE V.—GROSS BETA RADIOACTIVITY OF PARTICULATES IN AIR—Con.

PHS Radiation Surveillance Network

Station location	End of collection (Greenwich mean time)				Sampling period, hours	Days after collection	$\frac{\mu\mu c}{M^3}$*
	Yr.	Mo.	Day	Hr.			
Austin, Texas			17	21	7		
073—Con.			19	14	24	7	<0.10
			22	14	72	4	<0.10
			23	14	24	7	0.59
						14	0.39
			24	15	25	6	0.17
						13	0.13
			25	14	23	5	0.13
						12	0.13
			26	15	25	7	<0.10
			29	15	72		
		03	01	16	25	6	<0.10
Santa Fe, New Mexico	60	02	15	16	72	3	0.16
074						10	0.11
			16	16	24	3	0.10
						10	<0.10
			17	16	24	6	0.15
						13	0.15
			18	16	24	6	<0.10
			19	16	24	4	0.15
						11	0.16
			23	16	96	3	0.29
						10	0.18
			26	16	72	4	0.28
						11	0.27
			29	16	72	4	0.66
						11	0.50
	60	03	01	16	24	6	0.22
						13	0.18
			02	16	24	5	0.16
						12	0.15
			03	16	24	4	0.33
						11	0.32
			04	16	24	3	<0.10
			07	16	72	4	0.48
						11	0.39
			08	16	24	6	0.67
						13	0.51
			09	16	24	5	0.41
						12	0.34
			10	16	24	4	0.76
						11	0.67
			11	16	24	3	0.58
						10	0.43
			14	16	72	4	0.47
						11	0.42
			15	16	24	3	0.32
						10	0.25
			16	16	24	6	0.26
						13	0.22
			17	16	24	5	0.18
						12	0.17
			18	16	24	5	0.21
						12	0.20

*At time of measurement.

TABLE V.—GROSS BETA RADIOACTIVITY OF PARTICULATES IN AIR—Con.

PHS Radiation Surveillance Network

Station location	End of collection (Greenwich mean time)				Sampling period, hours	Days after collection	$\frac{\mu\mu c}{M^3}$*
	Yr.	Mo.	Day	Hr.			
El Paso, Texas 075	60	02	16	19	24	3	0.24
						10	0.17
			17	18	23	6	0.15
						13	0.16
			18	19	25	5	0.13
						12	0.14
			19	19	24	4	0.19
						11	0.16
			22	19	72	3	0.30
						10	0.27
			23	19	24	3	0.77
						10	0.49
			24	19	24	5	0.20
						12	0.19
			25	19	24	5	0.17
						12	0.25
			26	19	24	No sample received	
			29	19	72	4	1.26
						11	1.03
	60	03	01	19	24	6	0.40
						13	0.36
			02	19	24	5	0.16
						12	0.13
			03	19	24	4	0.70
						11	0.67
			04	19	24	3	0.51
						10	0.45
			07	19	72	3	1.23
						10	1.00
			08	19	24	6	0.97
						13	0.79
			09	19	24	5	1.23
						12	0.99
			10	20	25	4	1.24
						11	0.99
			11	19	23	3	1.08
						10	0.80
			14	19	72	4	0.74
						11	0.63
			15	19	24	3	0.55
						10	0.47
			16	19	24	6	0.45
						13	0.41
			17	19	24	5	0.43
						12	0.36
			18	19	24	4	0.34
						11	0.31
Denver, Colorado 081	60	02	15	23	79	4	0.12
						11	0.12
			16	17	18	8	0.18
						15	0.17
			17	16	23	6	0.13
						13	<0.10
			18	20	28	6	<0.10
			19	16	20	7	0.16
						14	0.20

*At time of measurement.

TABLE V.—GROSS BETA RADIOACTIVITY OF PARTICULATES IN AIR—Con.

PHS Radiation Surveillance Network

Station location	End of collection (Greenwich mean time)				Sampling period, hours	Days after collection	$\frac{\mu\mu c}{M^3}$*
	Yr.	Mo.	Day	Hr.			
Denver, Colorado			22	16	72	4	0.92
081—Con.						11	0.55
			23	16	24		
			25	18	50	5	0.21
						12	0.18
			26	16	22	7	0.15
						12	0.21
			29	18	74	7	0.21
						14	0.22
	60	03	02	16	46	5	0.25
						12	0.27
Salt Lake City, Utah	60	02	14	14	23	4	0.10
082						11	<0.10
			15	17	27	3	0.10
						10	<0.10
			16	16	23	3	0.14
						10	0.11
			17	16	24	6	<0.10
			18	16	24	6	<0.10
			19	18	26	4	0.97
						11	0.49
			20	16	22	5	0.66
						12	0.44
			21	14	22	5	0.31
						12	0.25
			22	17	27	4	0.24
						11	0.18
			23	19	26	7	0.11
						14	0.10
			24	16	21	6	0.15
						13	0.20
			25	16	24	5	0.24
						12	0.22
Phoenix, Arizona	60	02	23	16	96	7	0.22
092						14	0.20
			25	16	48	5	0.20
						12	0.11
			29	16	96	7	0.66
						14	0.63
		03	04			No sample received	
			07			No sample received	
			10	16	72	8	0.90
						15	0.75
			14	16	96	8	0.59
						15	0.47
			18	16	96	6	0.40
						13	0.36
			21	16	72	8	0.27
						15	0.22
Honolulu, Hawaii	60	02	15	18	72	3	<0.10
095			16	18	24	3	<0.10
			17	18	24	6	<0.10
			18	18	24	6	<0.10
			19	18	24	4	<0.10

*At time of measurement.

TABLE V.—GROSS BETA RADIOACTIVITY OF PARTICULATES IN AIR—Con.

PHS Radiation Surveillance Network

Station location	End of collection (Greenwich mean time)				Sampling period, hours	Days after collection	$\frac{\mu\mu c}{M^3}$*
	Yr.	Mo.	Day	Hr.			
Honolulu, Hawaii 095—Con.			23	18	96	3	0.28
						10	0.21
			24	18	24	6	0.27
						13	0.24
			25	18	24	5	0.20
						12	0.22
			26	18	24	4	0.33
						11	0.27
			29	18	72	4	0.27
						11	0.26
		03	01	18	24	3	0.29
						10	0.23
			02	18	24	5	0.18
						12	0.13
			03	18	24	4	0.36
						11	0.25
			04	18	24	3	<0.10
			07	18	72	3	0.37
						10	0.30
			08	18	24	3	0.69
						10	0.56
			09	18	24	5	0.69
						12	0.59
			10	18	24	4	0.86
						11	0.68
			11	18	24	3	0.54
						10	0.49
			14	18	72	3	0.25
						10	0.20
			15	18	24	3	0.36
						10	0.30
			16	18	24	6	0.32
						13	0.30
			17	18	24	5	0.27
						12	0.27
Silver Hill, Maryland T-000	60	02	17	13	24	6	0.11
						13	0.11
			18	13	24	5	0.19
						12	0.19
			19	13	24	4	0.10
						11	0.11
			20	13	24	4	0.13
						11	0.15
			21	13	24	3	0.11
						10	0.11
			22	13	24	3	0.32
						10	0.20
			23	13	24	3	0.15
						10	0.16
			24	13	24	6	0.15
						13	0.11
			25	13	24	5	0.15
						12	0.15
			26	13	24	4	<0.10
			27	13	24	3	<0.10

*At time of measurement.

TABLE V.—GROSS BETA RADIOACTIVITY OF PARTICULATES IN AIR—Con.

PHS Radiation Surveillance Network

Station location	End of collection (Greenwich mean time)				Sampling period, hours	Days after collection	$\frac{\mu\mu c}{M^3}$*
	Yr.	Mo.	Day	Hr.			
Metropolis, Illinois T-001	60	02	16	16	24	10	0.10
						17	<0.10
			17	16	24	9	<0.10
			18	16	24	8	<0.10
			19	16	24	7	<0.10
			20	16	24	6	0.10
						13	<0.10
			21	16	24	5	0.44
						12	0.29
			22	16	24	4	0.12
						11	0.16
			23	16	24	4	0.15
						11	0.13
			24	16	24	3	0.15
						10	0.13
			25	16	24	11	<0.10
			26	16	24	10	<0.10

*At time of measurement.

SECTION III

WATER

PUBLIC HEALTH SERVICE NATIONAL WATER QUALITY NETWORK

The National Water Quality Network was established under the provisions of Section 4(c) of Public Law 660, which states that ". . . the Surgeon General shall . . . collect and disseminate basic data . . . (relating) to water pollution and the prevention and control thereof."

This Network, operated in cooperation with State and local health agencies, was started in October 1957. At present there are 64 sampling stations located on major waterways used for public water supply, propagation of fish and wildlife, recreational purposes, and for agricultural, industrial and other uses; some of these stations are interstate, coastal, and International Boundary waters, and waters on which activities of the Federal Government may have an impact. Ultimately a total of 250 to 300 stations will be operated. A few of the more recently established stations have not yet begun to report radioactivity.

Samples of water are examined for chemical, physical, and biological quality insofar as these relate to pollution. Samples for some determinations are taken weekly, others monthly, and for some continuous composite samples of 10 to 15 days are obtained. Radioactivity determinations are made on single samples, taken weekly.

Gross alpha and beta measurements are made on both suspended and dissolved solids in the raw surface water samples. The radioactivity levels of dissolved solids provide a rough measure of the levels which may be found in a treated water, where such water treatment removes substantially all of the suspended matter. Naturally occurring radioactive substances in the environment are the source of essentially all of the alpha activity. The contamination of the environment from man-made sources is the major contributor to the beta activity. The results are reported in micromicrocuries per liter, and are shown for each station on a given river.

While beta determinations for the first two years of the Network operation have been done on each sample weekly, the alpha determinations are reported generally on a composite sample of more than one week. Beginning with samples taken in January 1960, beta determinations are to be performed on composite samples obtained by combining two weekly samples. The alpha data will be reported on three-month composite samples, with 1/3 of the stations being covered each month. All the data reported below represent the average of all information available for the month indicated.

Strontium-90 data are reported as being the results of determinations on composite sample for a three-month period ending in the month shown.

Additional information and data may be obtained from the following sources:

1. "National Water Quality Network Annual Compilation of Data," PHS Publication. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price $1.50.

2. "Report on National Water Quality Control Network," submitted by Dr. F. J. Weber, Chief, Division of Radiological Health, PHS, to Joint Committee on Atomic Energy Hearings on Fallout from Nuclear Weapons Tests, Vol. 1, May 1959, pages 167-169.

FIGURE 3

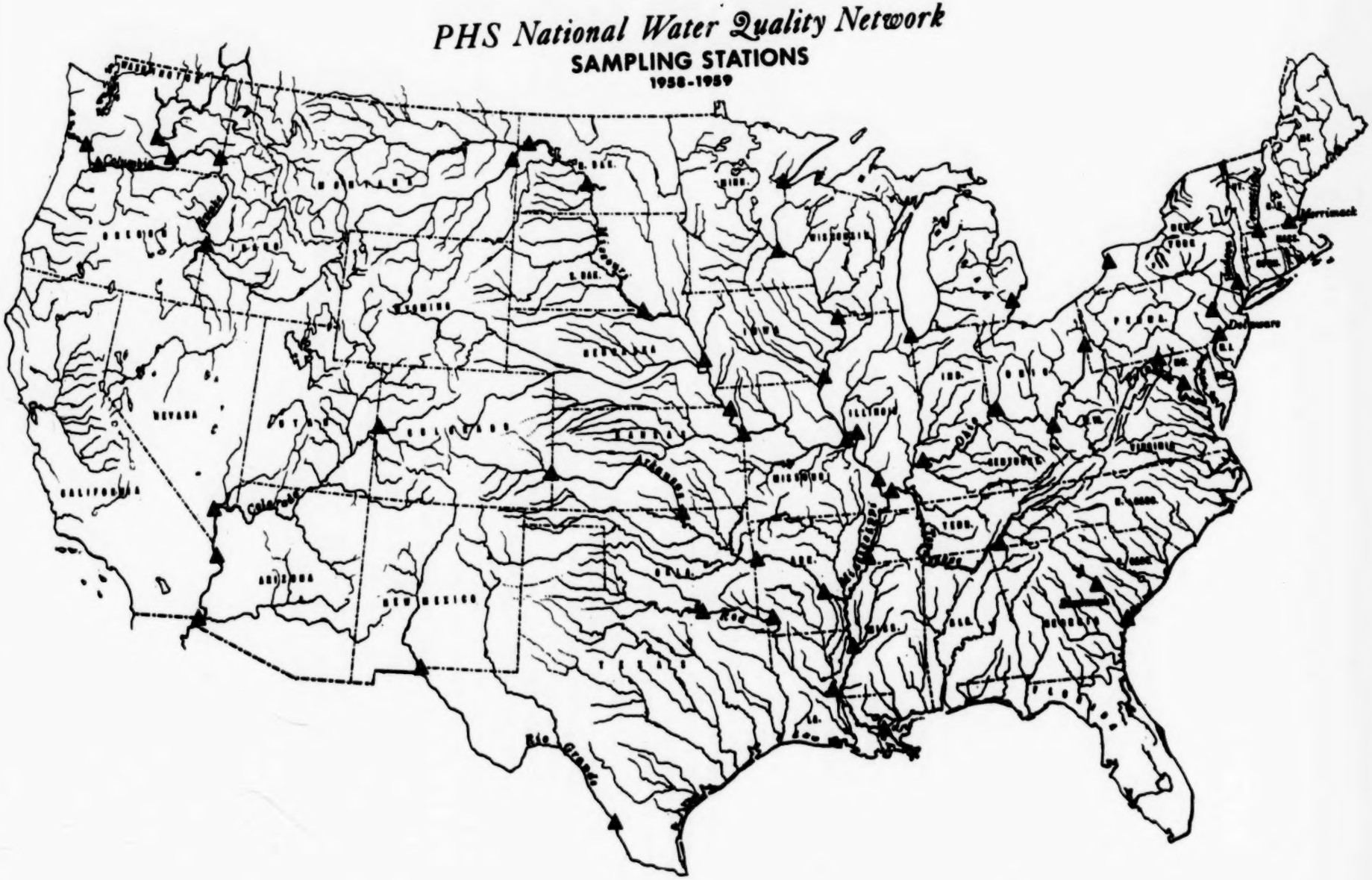
PHS National Water Quality Network
SAMPLING STATIONS
1958-1959

TABLE VI.—PUBLIC HEALTH SERVICE NATIONAL WATER QUALITY NETWORK
RADIOACTIVITY IN RAW SURFACE WATERS

(Micromicrocuries per liter)

Station	Quarter ending 12/31/59	Month of December, 1959 (Average to nearest whole number)					
	Strontium-90	Beta activity			Alpha activity		
		Susp.	Dis.	Tot.	Susp.	Dis.	Tot.
ALSEA RIVER							
Alsea, Oreg.	0.2	<1	<1	<1	0	0	0
ARKANSAS RIVER							
Coolidge, Kans.	0.4	0	0	0	3	36	39
Ponca City, Okla.	0.6	6	6	12	1	0	1
Fort Smith, Ark.	1.2	-	-	-	-	-	-
Pendleton Ferry, Ark.	0.6	2	0	2	-	-	-
CHATTAHOOCHIE RIVER							
Columbus, Ga.	0.2	<1	0	<1	-	-	-
COLORADO RIVER							
Loma, Colo.	0.3	0	8	8	1	12	13
Page, Ariz.	0.3	26	14	40	19	10	29
Hoover Dam, Ariz.-Nev.	0.7	0	2	2	0	7	7
Parker Dam, Ariz.-Calif.	0.7	2	10	12	0	7	7
Yuma, Ariz.	0.6	0	0	0	-	-	-
COLUMBIA RIVER							
Wenatchee, Wash.	0.8	0	1	1	-	-	-
Pasco, Wash.	0.9	84	711	795	0	0	0
Bonneville Dam, Oreg.	1.0	33	295	328	-	-	-
Clatskanie, Oreg.	0.5	30	167	197	-	-	-
CONNECTICUT RIVER							
Northfield, Mass.	0.3	<1	0	<1	0	0	0
DELAWARE RIVER							
Philadelphia, Pa.	0.6	0	0	0	-	-	-
GREAT LAKES							
Gary, Ind.	0.4	1	2	3	0	0	0
Duluth, Minn.	0.3	<1	0	<1	0	0	0
Detroit, Mich.	0.7	<1	2	2	0	0	0
Buffalo, N. Y.	1.1	4	6	10	0	0	0
HUDSON RIVER							
Poughkeepsie, N. Y.	1.3	2	0	2	1	0	1
MERRIMACK RIVER							
Lowell, Mass.	0.5	2	1	3	1	0	1
MISSISSIPPI RIVER							
Red Wing, Minn.	0.7	0	2	2	0	0	0
Dubuque, Iowa	0.4	0	4	4	0	1	1
Burlington, Iowa	1.0	0	2	2	1	0	1
East St. Louis, Ill.	0.5	0	2	2	0	1	1
Cape Girardeau, Mo.	0.4	7	6	13	1	1	2
West Memphis, Ark.	1.3	1	0	1	2	1	3
Delta, La.	1.0	6	3	9	3	1	4
New Orleans, La.	0.9	5	1	6	2	0	2

TABLE VI.—PUBLIC HEALTH SERVICE NATIONAL WATER QUALITY NETWORK
RADIOACTIVITY IN RAW SURFACE WATERS—Con.

(Micromicrocuries per liter)

Station	Quarter ending 12/31/59	Month of December, 1959 (Average to nearest whole number)					
	Strontium-90	Beta activity			Alpha activity		
		Susp.	Dis.	Tot.	Susp.	Dis.	Tot.
MISSOURI RIVER							
Williston, N. Dak.	0.5	0	0	0	1	2	3
Bismarck, N. Dak.	0.9	6	8	14	0	0	0
Yankton, S. Dak.	0.5	1	12	13	-	-	-
Omaha, Nebr.	1.0	< 1	4	5	1	4	5
St. Joseph, Mo.	0.4	2	0	2	0	4	4
Kansas City, Kans.	0.7	6	6	12	-	-	-
St. Louis, Mo.	0.6	6	18	24	4	4	8
OHIO RIVER							
East Liverpool, Ohio	0.6	11	0	11	3	0	3
Huntington, W. Va.	0.2	4	0	4	1	0	1
Cincinnati, Ohio	0.8	13	1	14	2	0	2
Cairo, Ill.	1.2	12	2	14	4	0	4
POTOMAC RIVER							
Williamsport, Md.	0.5	0	0	0	-	-	-
Great Falls, Md.	0.4	1	4	5	0	0	0
RED RIVER							
Denison, Tex.	1.9	7	14	21	0	1	1
Index, Ark.	0.9	0	4	4	1	2	3
Alexandria, La.	1.6	1	12	13	0	2	2
RIO GRANDE RIVER							
Laredo, Tex.	0.7	0	0	0	2	2	4
Brownsville, Tex.	0.3	16	14	30	-	-	-
ST. MARY'S RIVER							
Sault Ste. Marie, Mich.	0.3	0	< 1	< 1	0	0	0
SAVANNAH RIVER							
North Augusta, S. C.	0.7	0	4	4	-	-	-
Port Wentworth, Ga.	0.7	< 1	3	4	-	-	-
SNAKE RIVER							
Wawawai, Wash.	0.4	0	4	4	-	-	-
TENNESSEE RIVER							
Chattanooga, Tenn.	1.1	2	53	55	0	1	1
YELLOWSTONE RIVER							
Sidney, Mont.	0.7	5	24	29	-	-	-

PUBLIC HEALTH SERVICE—U. S. COAST GUARD

CISTERN WATER SAMPLES

Monthly samples of several roof-collected U. S. Coast Guard rain water cistern supplies are routinely analyzed for beta activity by the Robert A. Taft Sanitary Engineering Center, Public Health Service, Cincinnati, Ohio. Some samples are composited each three months and further analyzed for strontium-90 activity. Additional data concerning this investigation appears in "Statement on New Data on Uptake in Milk, Food and Human Bone," by C. P. Straub, submitted to Joint Committee Hearings on Fallout from Nuclear Weapons, May 1959, Vol. II, page 990.

Reference of this survey appears under letter H of the Selected List of Environmental Sampling Programs for Radioactivity in Water in this publication.

COAST GUARD CISTERN SAMPLES

Location	Date		Solids-ppm		Beta activity-($\mu\mu$c/l)	
	Collected	Counted	Susp.	Diss.	Diss.	Total
Swansboro	10/27/59	11/4	14	96	39	47
Metomkin	10/26	11/4	14	32	25	33
Cobb Island	10/30	11/4	2	53	36	47
Cape Hatteras	10/28	11/4	8	36	14	28
Cuckolds	10/28	11/30	21	71	15	15
Moosepeak	10/31	11/30	18	322	38	43
Cape Flattery	11/6	11/30	20	46	18	49
Patos Island	11/1	11/30	29	73	8	9
Grand Isle	11/4	11/30	16	60	4	4
Port O'Conner	11/20	12/2	16	72	16	25
Kwajalein	10/15	12/2	9	48	10	19
Cocos Island, Marianas, Guam	10/9	12/1	15	101	20	24
French Frigate, Shoals	10/15	12/1	21	456	51	72
Iowa Jima	10/26	12/1	13	51	7	7
Catanduanes, Panay Island, R. P.	10/15	12/1	12	78	4	4
Wake Island	10/8	12/2	16	224	24	27

Type of sample	Operating agency	Sponsoring agency	Where sampled	Number of stations	Frequency of sampling	Year established
A. Rainfall (pots and funnels)	Health and Safety Lab., AEC	AEC	Worldwide	121	Monthly	1954
B. Rainfall (washtubs)	Health and Safety Lab., AEC	AEC	U.S. (3 stations) and New Zealand (1 station)	4	Each rain	1955
C. Rainfall	USPHS Radiation Surveillance Network	AEC*	U.S.	37	Daily	1956
D. Rainfall, snow	Air Force Cambridge Research Center	AEC/DOD	76°N to 41°S	6	Biweekly, selected individual rains	1956
E. Rain, snow, sleet, hail	USPHS	USPHS	Cincinnati	1	Each precipitation	1958
F. Surface water	USPHS	USPHS	Ohio River at Cincinnati	1	Monthly	1956
G. Rain, snow	Mount Washington Observatory	AEC	New Hampshire	1	Each rainfall	1958
H. Cistern water	USPHS	USPHS	USCG Stations in U. S.	10	Monthly	1957
I. Cistern water	USPHS	USPHS	Cincinnati	1	Monthly	1957
J. Surface water	USPHS	USPHS	U.S.	55	Weekly composite	1957
K. Precipitation	USPHS National Air Sampling Network	U. S. Weather Bureau	Weather Bureau Stations	About 6	Monthly	1959
L. Tap water	HASL	HASL, AEC	New York City	1	Monthly	1954
M. Tap water	Tracerlab, Inc.	HASL, AEC	Richmond, California	1	Monthly	1958
N. Surface water	USPHS and 8 cooperating agencies	USPHS	Animas River Colorado-New Mexico	6	Intermittent	1958

* To be supplied entirely by USPHS in near future.

PROGRAMS FOR RADIOACTIVITY IN WATER

Principal in charge	Radioactivity analysis				Supplementary analysis
	Gross radiation	Fission products	Tracers	Natural activity	
Dr. John Harley HASL, AEC	Beta	Sr-90, Sr-89	W-185		Amount of rainfall
J. Z. Holland AEC, Wash., D.C.	Beta	Sr-90, Sr-89, BA-140, (Cs-137, New Zealand)	W-185 (Except New Zealand)		Solubility
H. J. Rechen, Jr.	Beta				
Dr. E. Martell	Gamma (Bedford)	Sr-90, Sr-89 (Ba-140, Bedford Jan. '58-Apr. '59)	W-185	Be-7, P-32 P-33, S-35 (Bedford, beginning 1960)	
Dr. L. R. Setter	Beta	Sr-90			
Dr. L. R. Setter	Beta				
Dr. Luis Aldaz		Sr-90			Type of precipitation
Dr. L. R. Setter	Beta	Sr-90			
Dr. L. R. Setter	Beta	Sr-90			
Dr. L. R. Setter	Beta and gamma (Same for alpha)	A few for Sr-90 and Sr-89			
Dr. L. R. Setter	Beta	Sr-90 (3 month composite)			
Dr. John Harley		Sr-90			
		Sr-90, Sr-89			
	Alpha and Beta				Dissolved radium in river water and water supplies, radium content of river muds, fish samples, algae. Gross radioactivity of river mud, river water, water supplies and algae. Sr-90 content selected foods.

METHODS OF PUBLICATION OF DATA

A. Health and Safety Laboratory, AEC (Pots)

HASL-42 U. S. Atomic Energy Commission, "Environmental Contamination From Weapons Tests," October 1958.

HASL-55 U. S. Atomic Energy Commission, "Strontium Program, Quarterly Summary Report," February 2, 1959.

HASL-65 U. S. Atomic Energy Commission, "Strontium Program, Quarterly Summary Report," May 29, 1959.

HASL-69 U. S. Atomic Energy Commission, "Strontium Program, Quarterly Summary Report," October 1, 1959.

HASL-77 U. S. Atomic Energy Commission, "Strontium Program, Quarterly Summary Report," January 1, 1960.

*HASL-84 U. S. Atomic Energy Commission, "Fallout Program, Summary Report," April 1960.

U. S. Atomic Energy Commission Quarterly Statements on Fallout.

"Summary of Analytical Results from the HASL Strontium Program July through December 1956," by J. H. Harley, E. P. Hardy, Jr., I. B. Whitney and M. Eisenbud. NYO-4751 (1956) Technical Information Service Extension, Oak Ridge, Tennessee. Reprinted in Joint Committee on Atomic Energy Hearings on Fallout, May 1957, Vol. I, pages 591-610.

"Measurement of Strontium-90 in Geophysical and Biological Materials," Statement of Merril Eisenbud, Manager, New York Operations Office, Atomic Energy Commission. Submitted to Joint Committee on Atomic Energy Hearings on Fallout, May 1957, Vol. I, page 554.

"Data on the Deposition of Strontium-90 During 1958." By J. H. Harley, E. P. Hardy, Jr., S. Klein and S. A. Lough. Reprinted in Joint Committee on Atomic Energy Hearings on Fallout, May 1959, Vol. I, page 373.

B. Health and Safety Laboratory AEC (Wash tubs)

HASL-42 U. S. Atomic Energy Commission, "Environmental Contamination from Weapons Tests," October 1958.

HASL-55 U. S. Atomic Energy Commission, "Strontium Program, Quarterly Summary Report," February 2, 1959.

HASL-65 U. S. Atomic Energy Commission, "Strontium Program, Quarterly Summary Report," May 29, 1959.

HASL-69 U. S. Atomic Energy Commission, "Strontium Program, Quarterly Summary Report," October 1, 1959.

HASL-77 U. S. Atomic Energy Commission, "Strontium Program, Quarterly Summary Report," January 1, 1960.

HASL-84 U. S. Atomic Energy Commission, "Fallout Program, Quarterly Summary Report," April 1960.

U. S. Atomic Energy Commission Quarterly Statements on Fallout.

C. USPHS Radiation Surveillance Network

1. USPHS Distribution List.
2. Joint Committee on Atomic Energy Congressional Hearings on Radioactive Fallout, May 1957.
3. U. S. Atomic Energy Commission Quarterly Statements on Fallout.
4. U. S. Department of Health, Education, and Welfare Monthly Reports on Radiological Health Data.

*Health and Safety Laboratory Fallout Program Quarterly Summary Report, April 1960, available from the Office of Technical Services, Department of Commerce, Washington 25, D. C. for $3.50.

D. U. S. Air Force Cambridge Research Center

"Natural Aerosols and Nuclear Debris Studies, Progress Report I." By P. J. Drevinsky, C. E. Junge, I. H. Blifford, Jr., M. I. Kalkstein and E. A. Martell. September 1958.

"Natural Aerosols and Nuclear Debris Studies, Progress Report II." By M. I. Kalkstein, P. J. Drevinsky, E. A. Martell, C. W. Chagnon, J. E. Manson, and C. E. Junge.

"Atmosphere Aspects of Strontium-90 Fallout." By E. A. Martell. Science, 129, 1197 (1959).

E. U. S. Public Health Service (Rain, Snow, Sleet, Hail)

1. "Statement on New Data on Uptake on Milk, Food and Bone." By Dr. C. P. Straub. Presented at Joint Committee on Atomic Energy Hearings on Fallout in May 1959, Volume 2, page 949.
2. "The Distribution of Radioactivity from Rain." By L. R. Setter and Dr. C. P. Straub. Trans Am. Geophysical Union, 39 (3): 451-458 (June 1958).
3. "The Radioactive Contamination of the Environment in the Cincinnati Area." By L. R. Setter and H. H. Russell. J. Am. Water Works Assn., 51 (4): 449-462 (April 1959).
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F. U. S. Public Health Service (Cincinnati Surface Water)

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G. Mount Washington Observatory

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H. U. S. Public Health Service—U. S. Coast Guard (Cistern Samples)

"Statement on New Data on Uptake in Milk, Food and Human Bone," by C. P. Straub, submitted to Joint Committee Hearings on Fallout from Nuclear Weapons, May 1959, Vol. II, page 990.

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J. U. S. Public Health Service National Water Quality Network

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8. "Detectability of Low-Level Radioactivity in Water." By A. S. Goldin, J. S. Nader and L. R. Setter. J. Am. Water Works Assoc., 45, 73 (1953).

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K. U. S. Public Health Service—Cincinnati

Preliminary Pilot Study—not yet available.

L. Health and Safety Laboratory AEC (Tap Water)

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HASL-77 U. S. Atomic Energy Commission, "Strontium Program, Quarterly Summary Report," January 1, 1960.

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U. S. Atomic Energy Commission Quarterly Statements on Fallout.

M. Tracerlab, Inc., Richmond, California (Tap Water)

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N. U. S. Health Service (Animas River Survey)

1. "Survey of Interstate Pollution of the Animas River, Colorado-New Mexico." By E. C. Tsivoglou, S. D. Shearer, R. M. Shaw, Jr., J. D. Jones, J. B. Anderson, C. E. Sponagle and D. A. Clark. U. S. Public Health Service Report, May 1959.

2. "Survey of Interstate Pollution of the Animas River, Colorado-New Mexico, II 1959 Surveys." By E. C. Tsivoglou, S. D. Shearer, J. D. Jones, C. E. Sponagle, H. R. Pahren, J. B. Anderson, and D. A. Clark. U. S. Public Health Service Report, January 1960.

SAMPLING STATION LOCATIONS

A. Health and Safety Laboratory—AEC

(Rainfall—pots and funnels)

SUMMARY—MONTHLY FALLOUT STATIONS

Total stations (11/23/59):	121
Total stations, Northern Hemisphere (11/23/59):	84
Total stations, Southern Hemisphere (11/23/59):	37
Number of pot stations:	40
Number of funnel stations:	81

MONTHLY FALLOUT STATIONS

Site	Lat. (°N)	Long. (°)
0-10°N (13 sites)		
Singapore	1	104 E
Columbia, Bogota*	5	17 W
Liberia, Monrovia	6	11 W
Nigeria, Lagos	6	3 E
Truk Island	7	152 E
Koror Island	7	135 E
Ponape Island	7	158 E
Majuro Island	7	171 E
Ceylon, Colombo	7	80 E
Canal Zone, Albrook AFB	9	80 W
Ethiopia, Addis Ababa	9	39 E
Yap Island	9° 32'	138 E
Costa Rica, Turrialba	9° 56'	84 W
10°-20°N (8 sites)		
Venezuela, Caracas	11	67 W
Thailand, Bangkok*	14	101 E
Senegal, Dakar*	15	17 W
Philippine Is., Clark AFB	15	121 E
Puerto Rico, San Juan	18	66 W
Mexico, Mexico City	19	99 W
Wake Island	19	167 E
Hawaii, Mauna Loa	19	155 W
20°-30°N (15 sites)		
Hawaii, Honolulu (University)*	21	158 W
Hawaii, Oahu (Weather Station)*	21	158 W
Hawaii, Oahu (AEC Lab)*	21	158 W
Hawaii, Lihue	22	158 W
Hong Kong	22	114 E
Taiwan, Taitung*	23	120 E
Taiwan, Tainan*	23	120 E
Taiwan, Taipei*	25	122 E
Iwo Jima	25	141 E
Pakistan, Karachi*	25	67 E
Florida, Coral Gables*	26	80 W

Site	Lat. (°N)	Long. (°)
20°-30°N (15 sites)—Con.		
Saudi Arabia, Dhahran	26	50° 8' E
Texas, Houston*	29° 45'	95 W
Louisiana, New Orleans	30° 00'	90 W
Libya, Wheelus AFB		
30°-40°N (20 sites)		
Egypt, Cairo	31	31 E
Texas, El Paso	32	106 W
Bermuda, Kindly AFB	32	65 W
Texas, Dallas	33	97 W
Japan, Nagasaki*	33	130 E
South Carolina, W. Columbia	34	81 W
Missouri, Columbia	34	81 W
California, Los Angeles*	34	118 W
Alabama, Birmingham*	34	87 W
Lebanon, Beirut	34	36 E
Japan, Hiroshima*	34	132 E
Morocco, Sidi Slimane	34	7 W
Oklahoma, Tulsa*	36	96 W
Japan, Tachikawa, AFB	36	140 E
California, San Francisco	37	122 W
Kentucky, Louisville	38	86 W
California, Richmond*	38	122 W
Maryland, Silver Hill	39	77 W
Azores, Lajes Field	39	27 W
Colorado, Denver	39° 41'	105 W
40°-50°N (17 sites)		
Pennsylvania, Pittsburgh*	40° 27'	80 W
Utah, Salt Lake City*	41	112 W
New York, New York	41	74 W
New Jersey, Westwood	41	74 W
Italy, Rome	42	13 E
Illinois, Lemont*	42	88 W
Massachusetts, Falmouth (Otis AFB)	42	71 W
Oregon, Medford	42	123 W

*Pots.

A. Health and Safety Laboratory—AEC—Con.

MONTHLY FALLOUT STATIONS—Con.

Site	Lat. (°N)	Long. (°)
40°-50°N (17 sites)—Con.		
Italy, Florence	44	11 E
Italy, Milan	45	9 E
Wisconsin, Green Bay	45	88 W
Montana, Helena	47	112 W
Austria, Klagenfurt*	48	16 E
Austria, Vienna	48	16 E
Washington, Neah Bay	48	124 W
North Dakota, Williston	48	104 W
Minnesota, International Falls	49	93 W
50°-60°N (5 sites)		
Newfoundland, Goose AFB	53	60 W
Alaska, Cold Bay	55	163 W
Scotland, Prestwick	56	5 W
Alaska, Juneau	58	134 W
Norway, Oslo	59° 55'	11 E
60°-70°N (4 sites)		
Alaska, Anchorage	61	150 W
Iceland, Keflavik	64	23 W
Alaska, Fairbanks	65	148 W
Alaska, Nome	65	165 W
70°-80°N (2 sites)		
Alaska, Barrow	71	157 W
Greenland, Thule AFB	77	69 W

Site	Lat. (°S)	Long. (°)
0°-10°S (7 sites)		
Ecuador, Quito	0° 14'	79 W
Brazil, Belem	1	49 W
Kenya, Nairobi	1	37 E
Kenya, Kikuyu*	1	37 E
Canton Island	3	172 W
Brazil, Manaus*	3	60 W
Belgian Congo, Leopoldville	4	15 E
10°-20°S (7 sites)		
Peru, Lima	12	77 W
Australia, Darwin*	12	131 E
Guam, Anderson AFB	13	145 E
Bolivia, La Paz	16	68 W
Fiji Is., Suva	18	178 E
Southern Rhodesia, Salisbury	18	31 E
Australia, Townsville	19	147 E
20°-30°S (10 sites)		
Brazil, Rio de Janeiro*	23	43 W
Brazil, Nova Friburgo*	23	43 W
Brazil, Sao Jose Des Campos* (State of Sao Paulo)	23	46 W
Brazil, Itaici* (State of Sao Paulo)	23	46 W
Union of South Africa, Pretoria*	26	28 E
Argentina, Tucuman	27	65 W
Australia, Brisbane*	27	153 E
Union of South Africa, Durban*	29° 52'	31 E
Brazil,		
Brazil,		
30°-40°S (7 sites)		
Australia, Perth*	32	116 E
Chile, Santiago*	33	71 W
Australia, Sydney*	34	151 E
Argentina, Bahia Blanca	35	59 W
Argentina, Buenos Aires	35	59 W
Australia, Adelaide*	35	139 E
Australia, Melbourne*	38	145 E
40°-50°S (2 sites)		
New Zealand, Wellington	41	175 E
Australia, Hobart*	43	147 E
50°-60°S (1 site)		
Argentina, Ushuaia	55	68 W

Undertermined Listings

Site
Germany, Rhein Main
Japan, Masawa AFB
Libya, Wheelus AFB

B. Health and Safety Laboratory—AEC

(Rainfall—Washtubs)

Pittsburgh, Pennsylvania
Westwood, New Jersey
Richmond, California
Gracefield, Lower Hutt, New Zealand

*Pots.

C. U. S. Public Health Service Radiation Surveillance Network

Harrisburg, Pennsylvania
Washington, D. C.
Richmond, Virginia
Atlanta, Georgia
Columbia, South Carolina
Indianapolis, Indiana
Cincinnati, Ohio
Minneapolis, Minnesota
Pierre, South Dakota
New Orleans, Louisiana
Austin, Texas
El Paso, Texas
Ponca City, Oklahoma
Salt Lake City, Utah
Boise, Idaho
Anchorage, Alaska
Berkeley, California
Honolulu, Hawaii
Seattle, Washington
Fairbanks, Alaska
Albany, New York
Gastonia, North Carolina
Jacksonville, Florida
Springfield, Illinois
Lansing, Michigan
Iowa City, Iowa
Jefferson City, Missouri
Topeka, Kansas
Oklahoma City, Oklahoma
Santa Fe, New Mexico
Little Rock, Arkansas
Denver, Colorado
Helena, Montana
Los Angeles, California
Portland, Oregon
Juneau, Alaska
Providence, Rhode Island

D. U. S. Air Force Cambridge Research Center

(1958-1959 Stations)

Thule, Greenland	76°N	(1958-1959)
Bedford, Massachusetts	42°N	
San Juan, Puerto Rico	18°N	(1958-1959)
Iquitos, Peru	3.5°S	
Porto Alegre, Brazil	30°S	
Puerto Montt, Chile	41°S	(1958-1959)
Selected polar areas		

E. U. S. Public Health Service Precipitation Sampling Station

1. Cincinnati, Ohio

F. U. S. Public Health Service Surface Water

2. Ohio River at Cincinnati

G. Mount Washington Observatory Precipitation Sampling Station

1. Mount Washington, New Hampshire

H. U. S. Public Health Service (Cistern Water)

Samples are collected for the following U. S. Coast Guard Stations:

Moosepeak	Swansboro	Patos Island	Cape Flattery	Metomkin Inlet
Cobb Island	Grand Isle	Cuckolds	Port O'Conner	Cape Hatteras

I. U. S. Public Health Service (Cistern Water)

1. Cincinnati, Ohio

U. S. Public Health Service National Water Quality Network

ALSEA RIVER
Alsea, Oreg.

ANIMAS RIVER
Cedar Hill, N. Mex.

APALACHICOLA RIVER
Chattahoochie, Fla.

ARKANSAS RIVER
Coolidge, Kans.
Ponca City, Okla.
Fort Smith, Ark.
Pendleton Ferry, Ark.

CHATTAHOOCHIE RIVER
Columbus, Ga.

COLORADO RIVER
Loma, Colo.
Page, Ariz.
Hoover Dam, Ariz.-Nev.
Parker Dam, Ariz.-Calif.
Yuma, Ariz.

COLUMBIA RIVER
Wenatchee, Wash.
Pasco, Wash.
Bonneville Dam, Oreg.
Clatskanie, Oreg.

CONNECTICUT RIVER
Northfield, Mass.

DELAWARE RIVER
Martin's Creek, Pa.
Philadelphia, Pa.

DETROIT RIVER
Detroit, Mich.

GREAT LAKES
Gary, Ind.
Duluth, Minn.
Buffalo, N. Y.

HUDSON RIVER
Poughkeepsie, N. Y.

ILLINOIS RIVER
Peoria, Ill.

U. S. Public Health Service National Water Quality Network—Con.

KANAWHA RIVER
Winfield, W. Va.

MERRIMACK RIVER
Lowell, Mass.

MISSISSIPPI RIVER
Red Wing, Minn.
Dubuque, Iowa
Burlington, Iowa
East St. Louis, Ill.
Cape Girardeau, Mo.
West Memphis, Ark.
Delta, La.
New Orleans, La.

MISSOURI RIVER
Williston, N. Dak.
Bismarck, N. Dak.
Yankton, S. Dak.
Omaha, Nebr.

MISSOURI RIVER—Con.
St. Joseph, Mo.
Kansas City, Kans.
St. Louis, Mo.

OHIO RIVER
East Liverpool, Ohio
Huntington, W. Va.
Cincinnati, Ohio
Evansville, Ind.
Cairo, Ill.

POTOMAC RIVER
Williamsport, Md.
Great Falls, Md.

RED RIVER
Denison, Tex.
Index, Ark.
Alexandria, La.

RIO GRANDE RIVER
El Paso, Tex.
Laredo, Tex.
Brownsville, Tex.

ST. MARY'S RIVER
Sault Ste. Marie, Mich.

SAVANNAH RIVER
North Augusta, S. C.
Port Wentworth, Ga.

SCHUYLKILL RIVER
Philadelphia, Pa.

SNAKE RIVER
Wawawai, Wash.
Weiser, Idaho

TENNESSEE RIVER
Chattanooga, Tenn.

YELLOWSTONE RIVER
Sidney, Mont.

K. U. S. Public Health Service—National Air Sampling Network

Nantucket, Mass.
Washington, D. C.
Cincinnati, Ohio
Caribou, Maine
Cape Hatteras, N. C.

L. Health and Safety Laboratory—Tap Water

1. New York, N. Y.

M. Tracerlab, Inc.—Tap Water

1. Richmond, Calif.

N. U. S. Public Health Service—Animas River Survey

The Animas River was sampled at six stations over a distance of about 60 miles, from a location above the Vanadium Corporation of America uranium mill (at Durango, Colorado) to Farmington, New Mexico, where it joins the San Juan River.

SECTION IV

OTHER DATA

EXTERNAL GAMMA ACTIVITY

PUBLIC HEALTH SERVICE RADIATION SURVEILLANCE NETWORK

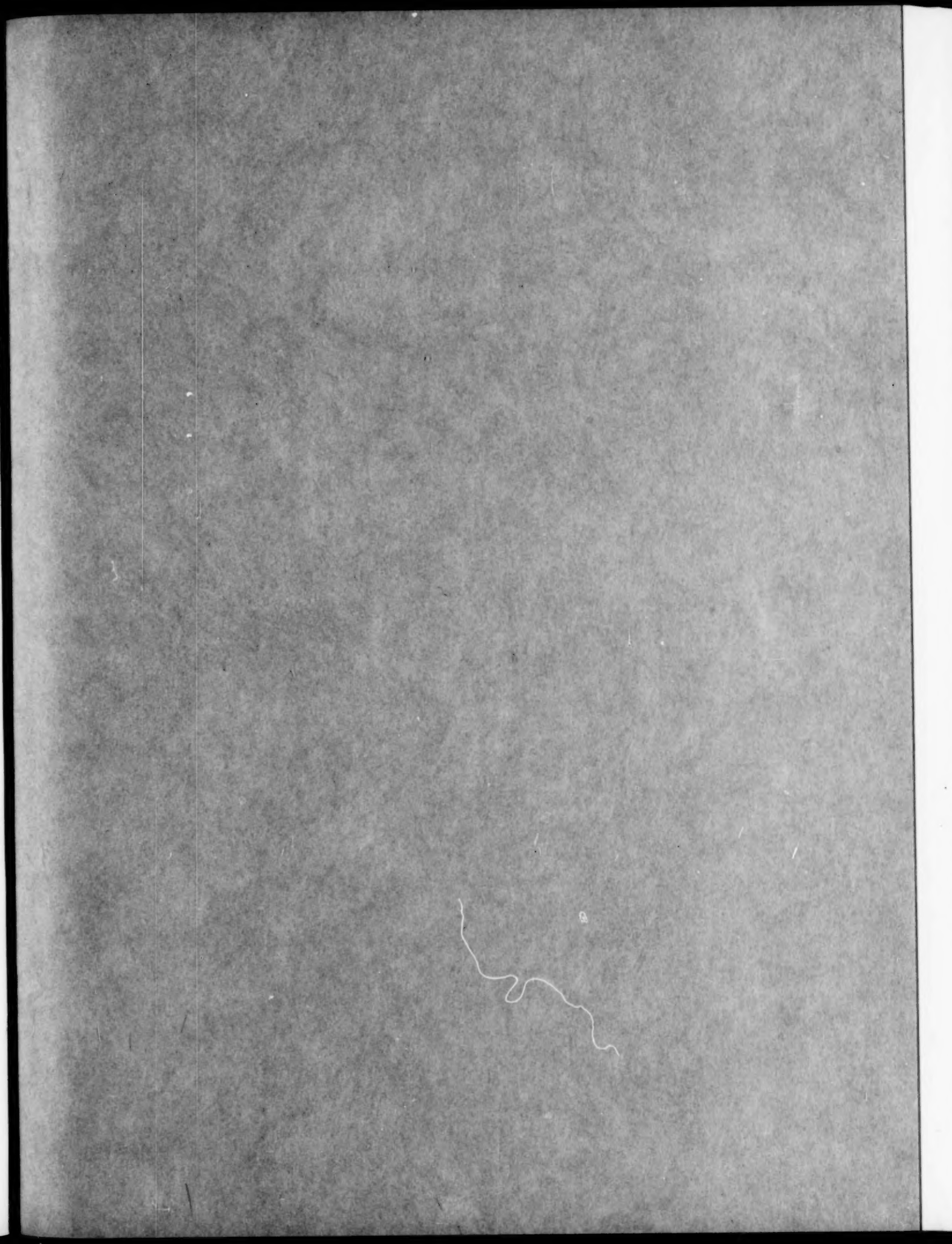
Portable survey instruments are available at the stations of the Radiation Surveillance Network and one of their uses is to record external gamma radiation. These readings are not precise, especially for measurement of low levels but they can show the presence or absence of any significant increases above background. The differences among the values shown on the following table are within the variances anticipated due to differences in normal background and in instrument response characteristics.

TABLE VIII—EXTERNAL GAMMA ACTIVITY

PUBLIC HEALTH SERVICE RADIATION SURVEILLANCE NETWORK

Milliroentgens per hour—at three feet above the ground for month of January 1960

Station location	Average	Station location	Average
Alaska, Anchorage	0.01	Minnesota, Minneapolis	0.02
Alaska, Fairbanks	0.01	Mississippi, Pascagoula	(*)
Alaska, Juneau	0.02	Missouri, Jefferson City	0.01
Arizona, Phoenix	0.01	Montana, Helena	0.03
Arkansas, Little Rock	0.02	New Jersey, Trenton	0.02
California, Berkeley	(*)	New Mexico, Santa Fe	0.04
California, Los Angeles	0.01	New York, Albany	0.02
Colorado, Denver	0.02	North Carolina, Gastonia	0.02
Connecticut, Hartford	0.02	Ohio, Cincinnati	(*)
District of Columbia	0.02	Oklahoma, Oklahoma City	0.02
Florida, Jacksonville	0.02	Oklahoma, Ponca City	0.04
Georgia, Atlanta	0.02	Oregon, Portland	0.02
Hawaii, Honolulu	0.02	Pennsylvania, Harrisburg	(*)
Idaho, Boise	(*)	Rhode Island, Providence	0.02
Illinois, Springfield	(*)	South Carolina, Columbia	0.02
Indiana, Indianapolis	0.01	South Dakota, Pierre	0.02
Iowa, Iowa City	0.01	Texas, Austin	0.02
Kansas, Topeka	0.02	Texas, El Paso	0.02
Louisiana, New Orleans	0.01	Utah, Salt Lake City	0.02
Maryland, Baltimore	0.02	Virginia, Richmond	0.01
Massachusetts, Lawrence	0.02	Washington, Seattle	0.02
Michigan, Lansing	0.02	Wyoming, Cheyenne	0.02

*No data received.

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